



**Global Nexus Institute**  
— Innovation & Excellence —

## Professional Data science & Artificial Intelligence

The Global Nexus Institute is dedicated to transforming the lives of talented individuals by equipping them with modern, relevant skills necessary for success in today's data-driven world.



### Our Mission

To provide high-quality, accessible education that bridges local needs with global opportunities, creating pathways to employment, innovation, and societal impact.

### Our Vision

To be a transformative institution that empowers the next generation of leaders, innovators, and professionals in technology and data sciences across Africa and beyond.

### Why Data Science?

Data science is one of the most sought-after skill sets in the 21st century, often referred to as the "sexiest profession" by Harvard Business Review. The field harnesses vast amounts of data generated every minute, utilizing powerful processing capabilities and open-source algorithms to solve complex problems.



### The demand for data scientists is driven by four megatrends:

- Cloud Efficiency: Cost-effective storage solutions for vast quantities of data.
- Increased Processing Power: Exponential growth in computer processing capabilities.
- Open-Source Algorithms: Accessibility of powerful algorithms for data manipulation.
- Big Data: The continuous generation of large volumes of data.

### Who Is This Course For?

- This course is ideal for individuals who wish to enhance their skills or transition into the field of data science. It caters to:
- Newcomers; those looking to fill gaps in their analytical knowledge.
- Professionals Seeking Upskilling: Individuals from various industries wanting to future-proof their careers with modern data techniques.
- Recent Graduates or Career Changers: Those intrigued by technology and looking for a career in data science.

### Requirements

To enroll in the Global Nexus Institute's Data Science course and Artificial Intelligence, Business Data Analytics, or Computing & Data Science, participants must meet the following requirements:



[www.globalnexus.co.rw](http://www.globalnexus.co.rw)



[info@globalnexus.co.rw](mailto:info@globalnexus.co.rw)



+250 787 406 140/+254 707 825181



Basic Requirements

- Basic computer literacy (using a web browser, operating an email,...
- Access to a computer, the internet, and software.
- Access to Google office productivity apps (Docs, Sheets, Slides) or Microsoft Office apps (Word, Excel, PowerPoint).
- Google Chrome or any popular browser to access the learning management system.



Technical Requirements:

- Operating System: Windows 10 recommended (Windows 7 minimum) for Power BI; MacOS running Parallels for Windows will also suffice.
- Processor: Minimum i3 with a clock speed of 2 GHz.
- RAM: Minimum 4 GB.
- Internet Speed: A minimum line speed of 10 Mbps and 20 GB of data per month.
- Communication Communication Hardware: Webcam and microphone.

Additional Requirements:

- Familiarity with platforms like Google, YouTube, and DataCamp may be necessary as these services are used throughout the course.
- A basic understanding of mathematics and statistics is recommended.
- Basic knowledge of at least one programming language is beneficial but not required.



Students will engage through:

- Real-time chat platforms and forums.
- Interactive content including video lectures, coding assignment, oral presentation.
- Practical assignments and quizzes that reinforce learning through real-world applications.

Course Curriculum Overview

Global Nexus Institute offers a comprehensive data science program, covering PowerBI for Data Visualization, Python Programming, and SQL for Data Analysis. Students learn Supervised and Unsupervised Machine Learning to analyze and model data, along with Natural Language Processing & AI for working with language data. The program concludes with Data Science Projects, allowing students to apply their skills to real-world challenges, ensuring they are job-ready and equipped to contribute to the tech industry.



Module	Duration (Weeks)	Time in Hours
Data Science/Analytics with Excel	2	60
Python Programming For All	3	90
Statistical Data Analysis	3	90
Python for Data Science and Analytics	5	150
SQL for Data Analysis	4	120
Data Visualization with Power BI	4	120
Machine Learning and AI	6	180
Capstone Project and Job Readiness	5	90
Total	32	900



## Introduction to Professional DS & AI :

The Professional Data Science & AI course at **Global Nexus Institute** offers a comprehensive curriculum designed to provide both theoretical knowledge and practical skills needed to succeed in the field of data science. With a focus on real-world applications, this 8-month program covers a wide range of tools, techniques, and concepts. Below is a detailed breakdown of the course modules:

### Course Overview

- Duration: 8 months
- Prerequisites: A basic analytical background. Familiarity with programming is helpful
- Tools Learned: Python, Jupyter Notebooks, Excel, Github, MySQL, Power BI, Scikit-learn.

## 1. Data Science/Analytics with Excel (2 Week)

### Key Learning Objectives:

- Understand the basics of data analysis using Excel.
- Learn to clean, manipulate, and analyze data using Excel functions and tools.
- Create pivot tables, charts, and dashboards for data visualization.
- Perform basic statistical analysis using Excel.
- Use Excel for data-driven decision-making.



### Lessons:

1. **Introduction to Excel for Data Analysis:** Overview of Excel interface, basic functions, and data entry.
2. **Data Cleaning in Excel:** Techniques for handling missing data, removing duplicates, and data validation.
3. **Data Manipulation:** Using Excel functions (VLOOKUP, HLOOKUP, INDEX, MATCH) for data manipulation.
4. **Pivot Tables and Charts:** Creating pivot tables, pivot charts, and slicers for data summarization and visualization.
5. **Basic Statistical Analysis:** Using Excel for descriptive statistics, correlation, and regression analysis.
6. **Dashboard Creation:** Building interactive dashboards using Excel.

Project: Sales Data Analysis Dashboard.

## 2. Python Programming For All (3 Weeks)



### Key Learning Objectives:

- Write your first Python program using variables, strings, functions, loops, and conditions.
- Understand Python data structures: lists, sets, dictionaries, tuples, and their use cases.
- Master Python programming fundamentals, including conditions, branching, and object-oriented programming (OOP).
- Work with data in Python: reading/writing files, loading/saving data with Pandas, and basic data manipulation.
- Gain proficiency in NumPy for numerical computing and array operations.

### Lessons:

1. **Python Basics:** Syntax, variables, data types, and basic operations.
2. **Python Data Structures:** Lists, sets, dictionaries, tuples, and their methods.
3. **Python Programming Fundamentals:** Functions, loops, conditions, and error handling.
4. **Object-Oriented Programming (OOP):** Classes, objects, inheritance, and polymorphism.
5. **Working with Data in Python:** File I/O, CSV/JSON handling, and introduction to Pandas.
6. **NumPy for Numerical Computing:** Arrays, array operations, and mathematical functions.

Project: Weather Data Analysis (identify patterns like seasonal trends, extreme weather events).





### 3. Statistical Data Analysis (3 Weeks)

#### Key Learning Objectives:

- Understand the fundamentals of descriptive and inferential statistics.
- Apply statistical methods to analyze data and draw conclusions.
- Gain proficiency in hypothesis testing, confidence intervals, and probability distributions.
- Understand the application of statistical techniques in real-world data analysis.



#### Lessons:

- **Descriptive Statistics:** Measures of central tendency, variability, and data distributions.
- **Probability Distributions:** Normal, binomial, Poisson, and other distributions.
- **Inferential Statistics:** Hypothesis testing, p-values, confidence intervals, and statistical significance.
- **Correlation and Regression:** Understanding relationships between variables and predictive modeling.
- **Statistical Analysis with Python:** Using libraries like SciPy and StatsModels for statistical analysis.

Project: Customer Churn Analysis.

### 4. Python for Data Science and Analytics (5 Weeks)

#### Key Learning Objectives:

- Gain an in-depth understanding of the data science workflow: data wrangling, exploration, visualization, and modeling.
- Perform advanced data manipulation and analysis using Pandas.
- Master scientific computing with NumPy and SciPy.
- Build and evaluate machine learning models using Scikit-Learn.
- Understand supervised and unsupervised learning techniques: regression, classification, clustering, and dimensionality reduction.
- Explore AI concepts such as natural language processing (NLP) and text mining with Scikit-Learn.
- Visualize data using Matplotlib, Seaborn, and Plotly.



#### Lessons:

1. **Data Science Overview:** Workflow, tools, and best practices.
2. **Python Environment Setup:** Anaconda, Jupyter Notebook, and essential libraries.
3. **Data Manipulation with Pandas:** DataFrames, Series, and advanced operations.
4. **Mathematical Computing with NumPy:** Arrays, linear algebra, and random sampling.
5. **Scientific Computing with SciPy:** Optimization, integration, and statistical functions.
6. **Machine Learning with Scikit-Learn:** Supervised and unsupervised learning.
7. **Natural Language Processing (NLP):** Text preprocessing, sentiment analysis, and topic modeling.
8. **Data Visualization:** Matplotlib, Seaborn, and interactive visualizations with Plotly.

Project: Movie Recommendation System.

## 5. SQL for Data Analysis

### Key Learning Objectives:

- Understand relational databases and SQL fundamentals.
- Write complex SQL queries: filtering, sorting, joins, subqueries, and aggregations.
- Master database management: backups, restores, and user access control.
- Understand database design, indexing, and optimization.



### Lessons:

1. **SQL Fundamentals:** Basic queries, filtering, and sorting.
2. **Advanced SQL:** Joins, subqueries, and aggregations.
3. **Database Management:** Backups, restores, and transactions.
4. **Database Optimization:** Indexing, views, and performance tuning.

Project: Employee Database Analysis.

## 6. Data Visualization with Power BI (4Weeks)

- Key Learning Objectives:
- Master data visualization techniques: charts, dashboards, and storytelling.
- Understand data blending, filtering, and advanced analytics.
- Create interactive dashboards and reports.
- Explore Level of Detail (LOD) expressions and calculations.



### Lessons:

- **Introduction to Power BI:** Interface, data import, and basic visualizations.
- **Data Transformation:** Cleaning, shaping, and modeling data.
- **Advanced Visualizations:** Heatmaps, treemaps, and custom visuals.
- **Dashboard Design:** Best practices for creating interactive dashboards.
- **Advanced Analytics:** Filters, parameters, and LOD expressions.

Project: Sales Performance Dashboard.

## 7: Machine Learning & Artificial Intelligence (6 Weeks)

### Key Learning Objectives:

- Master supervised and unsupervised learning techniques.
- Build and evaluate models: regression, classification, clustering, and dimensionality reduction.
- Understand ensemble methods: bagging, boosting, and stacking.
- Explore time series modeling and recommendation systems.
- Validate models using cross-validation and accuracy metrics.
- Apply feature engineering and hyperparameter tuning for model optimization.
- Introduction to AI Applications: Explore AI use cases in machine learning, such as recommendation systems and NLP.



### Lessons:

1. **Introduction to Machine Learning:** Concepts, workflows, and applications.
2. **Supervised Learning:** Linear regression, logistic regression, and decision trees.
3. **Ensemble Learning:** Random forests, gradient boosting, and XGBoost.
4. **Unsupervised Learning:** K-means clustering, hierarchical clustering, and PCA.
5. **Time Series Modeling:** ARIMA, SARIMA, and forecasting.
6. **Recommender Systems:** Collaborative filtering and content-based filtering (AI applications).
7. **Model Evaluation:** Cross-validation, ROC curves, confusion matrices, R-squared, RMSE, Accuracy\_score.

Project: Customer Churn Prediction.







## 8: Capstone Project and Job Readiness (5 Weeks)

### Key Learning Objectives:

- Apply end-to-end data science techniques: data cleaning, exploration, and modeling.
- Build and fine-tune machine learning models using Python.
- Create a dashboard to present insights using Power BI or Tableau.
- Demonstrate problem-solving skills and deliver actionable insights.

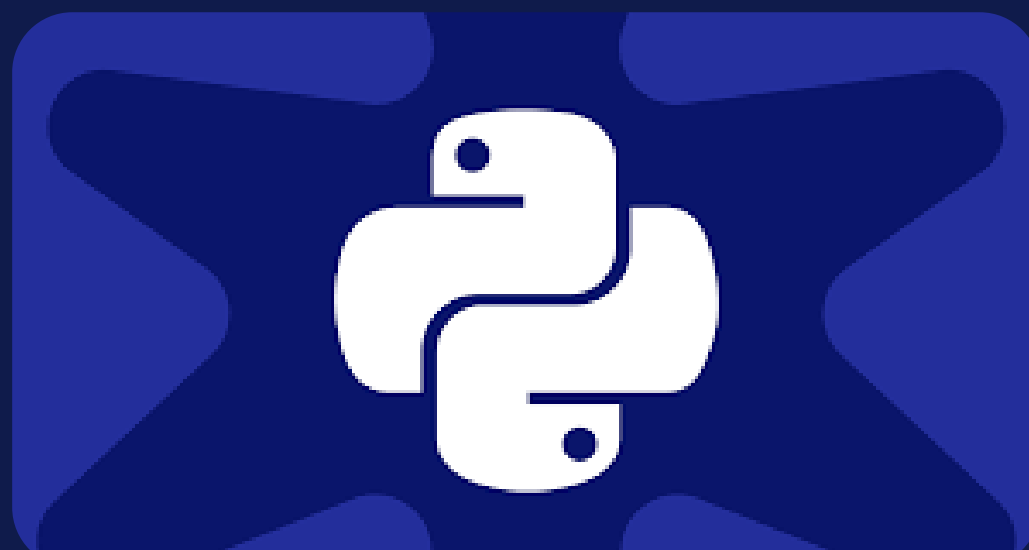
### Project Phases:

1. **Data Collection and Cleaning:** Gather and clean a real-world dataset (e.g., healthcare, finance, or e-commerce).
2. **Exploratory Data Analysis (EDA):** Perform EDA to uncover patterns and insights.
3. **Model Building:** Build and fine-tune a machine learning model.
4. **Model Optimization:** Optimize the model using hyperparameter tuning and feature engineering.
5. **Dashboard Creation:** Create a dashboard to visualize insights.
6. **Final Presentation:** Present findings and recommendations to stakeholders.

### Job Readiness:

- Interview preparation both in person and online
- Build a portfolio showcasing projects (e.g., GitHub, personal website).
- Practice common data science interview questions and coding challenges.
- Prepare a resume highlighting technical skills and project experience.

### Data Science and Analytics Tools



Global Nexus Institute  
Innovation & Excellence

